



46

SEQUENCE LISTING

<110> KUSTERS, Johannes G.
CATTOLI, Giovanni

<120> HELICOBACTER FELIS VACCINES

<130> KUSTERS

<140> 09/904,994
<141> 2001-07-13

<150> EP00202565.8
<151> 2000-07-17

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<170> PatentIn Ver. 2.1

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taaaatttaa cacaaggagt aatag gtg aaa ctc aca ccc aaa gag caa gaa 232
Val Lys Leu Thr Pro Lys Glu Gln Glu
1 5

aag ttc ttg tta tat tat gcg ggc gaa gtg gct aga aag cgc aaa gca 280
Lys Phe Leu Leu Tyr Tyr Ala Gly Glu Val Ala Arg Lys Arg Lys Ala
10 15 20 25

gag ggc tta aag ctc aac caa ccc gaa gcc att gct tac att agt gcc 328

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ggt acg aaa ctt gta act gtg aat tgg ccc atc gaa cca gat gag cac															520	
Gly	Thr	Lys	Leu	Val	Thr	Val	Asn	Trp	Pro	Ile	Glu	Pro	Asp	Glu	His	
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ttc aaa gcg ggc gaa gtg aaa ttt ggt tgc gat aaa gac atc gag ctc															568	
Phe	Lys	Ala	Gly	Glu	Val	Lys	Phe	Gly	Cys	Asp	Lys	Asp	Ile	Glu	Leu	
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aaa tcc ttg cat gtg ggt agc cat ttc cac ttc ttt gaa gct aac aag															664	
Lys	Ser	Leu	His	Val	Gly	Ser	His	Phe	His	Phe	Phe	Glu	Ala	Asn	Lys	
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Pro	Ser	Gly	Asn	Thr	Leu	Arg	Ile	Gly	Ala	Gly	Gln	Thr	Arg	Lys	Val	
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Gln	Leu	Ile	Pro	Leu	Gly	Gly	Ser	Lys	Lys	Val	Ile	Gly	Met	Asn	Gly	
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Val Arg Leu Gly Asp Thr Asp Leu Trp Ala Glu Val Glu His Asp Tyr				
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Val Ile Thr Asn Ala Met Ile Ile Asp Tyr Thr Gly Ile Tyr Lys Ala				
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gac att ggg att aaa aac ggc aaa atc cat ggc att ggc aag gca gga				1193
Asp Ile Gly Ile Lys Asn Gly Lys Ile His Gly Ile Gly Lys Ala Gly				
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aac aag gac atg caa gat ggc gta agc cct cat atg gtc gtg ggt gtg				1241
Asn Lys Asp Met Gln Asp Gly Val Ser Pro His Met Val Val Gly Val				
330	335	340		
ggc aca gaa gca cta gca ggg gaa ggt atg att att acc gct ggg gga				1289
Gly Thr Glu Ala Leu Ala Gly Glu Gly Met Ile Ile Thr Ala Gly Gly				
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atc gat tca cac acc cac ttc ctt tct cca caa caa ttc cct acc gct				1337
Ile Asp Ser His Thr His Phe Leu Ser Pro Gln Gln Phe Pro Thr Ala				
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Leu Ala Asn Gly Val Thr Thr Met Phe Gly Gly Thr Gly Pro Val				
375	380	385	390	
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Asp Gly Thr Asn Ala Thr Thr Ile Thr Pro Gly Lys Trp Asn Leu His				
395	400	405		
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Arg Met Leu Arg Ala Ala Glu Glu Tyr Ser Met Asn Val Gly Phe Leu				
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Gly Lys Gly Asn Ser Ser Ser Lys Lys Gln Leu Val Glu Gln Val Glu				
425	430	435		
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Ala Gly Ala Ile Gly Phe Lys Leu His Glu Asp Trp Gly Thr Thr Pro				
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Ser Ala Ile Asp His Cys Leu Ser Val Ala Asp Glu Tyr Asp Val Gln				
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Val Cys Ile His Thr Asp Thr Val Asn Glu Ala Gly Tyr Val Asp Asp				
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Thr Leu Asn Ala Met Asn Gly Arg Ala Ile His Ala Tyr His Ile Glu				
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680	685	690		2297
695	700	705	710	2345
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Arg Tyr Thr Phe Phe
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Arg Gly Lys Lys Thr Val Ala Gln Leu Met Glu Glu Cys Met His Phe
50 55 60
Leu Lys Lys Asp Glu Val Met Pro Gly Val Gly Asn Met Val Pro Asp
65 70 75 80
Leu Gly Val Glu Ala Thr Phe Pro Asp Gly Thr Lys Leu Val Thr Val
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Phe Gly Cys Asp Lys Asp Ile Glu Leu Asn Ala Gly Lys Glu Val Thr
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His Phe His Phe Phe Glu Ala Asn Lys Ala Leu Lys Phe Asp Arg Glu
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Tyr Lys Ala Asp Ile Gly Ile Lys Asn Gly Lys Ile His Gly Ile Gly
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115 120 125
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Tyr Thr Ile Asn Thr Val Ala Glu His Leu Asp Met Leu Met Thr Cys
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 His His Leu Asp Lys Arg Ile Arg Glu Asp Leu Gln Phe Ser Gln Ser
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 Arg Ile Arg Pro Gly Ser Ile Ala Ala Glu Asp Val Leu His Asp Met
 340 345 350
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 370 375 380
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 385 390 395 400
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 405 410 415
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 Ser Val Pro Thr Pro Gln Pro Val Tyr Tyr Arg Glu Met Phe Gly His
 465 470 475 480
 His Gly Lys Ala Lys Phe Asp Thr Ser Ile Thr Phe Val Ser Lys Val
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 Arg Gly Lys Lys Thr Val Ala Glu Leu Met Glu Glu Cys Met His Phe
 50 55 60
 ttg aaa aaa gat gag gtg atg ccc ggt gtg ggg aat atg gtc cct gat 240
 Leu Lys Lys Asp Glu Val Met Pro Gly Val Gly Asn Met Val Pro Asp
 65 70 75 80
 ttg ggc gta gaa gcc act ttc ccc gat ggc acc aaa ctc gta acc gtg 288
 Leu Gly Val Glu Ala Thr Phe Pro Asp Gly Thr Lys Leu Val Thr Val
 85 90 95
 aat tgg ccc att gaa cct gat gaa cac ttt aaa gcc ggt gaa gtg aaa 336
 Asn Trp Pro Ile Glu Pro Asp Glu His Phe Lys Ala Gly Glu Val Lys
 100 105 110
 ttt ggc tgt gat aaa gac att gag ctc aac gcg ggt aag gaa gtt acc 384
 Phe Gly Cys Asp Lys Asp Ile Glu Leu Asn Ala Gly Lys Glu Val Thr
 115 120 125
 gag ctt gaa gtt acc aac gaa gga cct aaa tcc ttg cat gtg ggt agc 432
 Glu Leu Glu Val Thr Asn Glu Gly Pro Lys Ser Leu His Val Gly Ser
 130 135 140
 cat ttc cac ttc ttt gaa acc aac aag gca ttg aaa ttc gat cggt gaa 480
 His Phe His Phe Glu Thr Asn Lys Ala Leu Lys Phe Asp Arg Glu
 145 150 155 160
 aaa gcc tat ggc aaa cgc cta gat att ccc tct ggc aac acg cta cgc 528
 Lys Ala Tyr Gly Lys Arg Leu Asp Ile Pro Ser Gly Asn Thr Leu Arg
 165 170 175
 att ggg gca gga caa acc cgt aaa gtg cag tta atc cct ctt ggc ggt 576

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agt aaa aaa gtg att ggc atg aac ggg ctt gtg aat aat att gcg gac															624	
Ser	Lys	Lys	Val	Ile	Gly	Met	Asn	Gly	Leu	Val	Asn	Asn	Ile	Ala	Asp	
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gaa cgc cat aaa cac aaa gca cta gac aag gca aaa tct cac gga ttc															672	
Glu	Arg	His	Lys	His	Lys	Ala	Leu	Asp	Lys	Ala	Lys	Ser	His	Gly	Phe	
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acc tac gga ccc acc aca ggc gat aaa gtg cgc tta gga gat acc gat															769	
Thr	Tyr	Gly	Pro	Thr	Gly	Asp	Lys	Val	Arg	Leu	Gly	Asp	Thr	Asp		
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ctt tgg gca gaa gta gaa cat gac tat acc act tat ggc gaa gag ctc															817	
Leu	Trp	Ala	Glu	Val	Glu	His	Asp	Tyr	Thr	Thr	Tyr	Gly	Glu	Glu	Leu	
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270				275					280			285				
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Ser	Pro	Asp	Glu	Asn	Thr	Leu	Asp	Leu	Val	Ile	Thr	Asn	Ala	Met	Ile	
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Met Phe Gly Gly Gly Thr Gly Pro Val Asp Gly Thr Asn Ala Thr Thr			
385	390	395	
atc act ccg ggc aaa tgg aac ttg cac cgc atg ttg cgc gca gct gaa			1249
Ile Thr Pro Gly Lys Trp Asn Leu His Arg Met Leu Arg Ala Ala Glu			
400	405	410	
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Glu Tyr Ser Met Asn Val Gly Phe Leu Gly Lys Gly Asn Ser Ser Ser			
415	420	425	
aaa aaa caa ctc gta gaa caa gta gaa gcg ggc gcg att ggc ttt aaa			1345
Lys Lys Gln Leu Val Glu Gln Val Glu Ala Gly Ala Ile Gly Phe Lys			
430	435	440	445
ttg cat gaa gac tgg ggc aca aca cca agt gcg atc gat cac tgc ttg			1393
Leu His Glu Asp Trp Gly Thr Thr Pro Ser Ala Ile Asp His Cys Leu			
450	455	460	
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Ser Val Ala Asp Glu Tyr Asp Val Gln Val Cys Ile His Thr Asp Thr			
465	470	475	
gtc aat gag gca ggt tat gta gat gac acc cta aat gcg atg aac ggg			1489
Val Asn Glu Ala Gly Tyr Val Asp Asp Thr Leu Asn Ala Met Asn Gly			
480	485	490	
cgc gcc atc cat gcc tac cac att gag gga gcg ggc gga gga cac tca			1537
Arg Ala Ile His Ala Tyr His Ile Glu Gly Ala Gly Gly His Ser			
495	500	505	
cct gat gtt atc acc atg gca ggc gag ctc aat att cta ccc tcc tcc			1585
Pro Asp Val Ile Thr Met Ala Gly Glu Leu Asn Ile Leu Pro Ser Ser			
510	515	520	525
acc acc ccc act att ccc tat acc att aat acg gtt gca gaa cac tta			1633
Thr Thr Pro Thr Ile Pro Tyr Thr Ile Asn Thr Val Ala Glu His Leu			
530	535	540	
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Asp Met Leu Met Thr Cys His His Leu Asp Lys Arg Ile Arg Glu Asp			
545	550	555	
ctc cag ttt tcc caa agc cgt atc cgc ccc ggc tct att gcc gct gaa			1729

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Asp Val Leu His Asp Ile Gly Val Ile Ala Met Thr Ser Ser Asp Ser			
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Gln Ala Met Gly Arg Ala Gly Glu Val Ile Pro Arg Thr Trp Gln Thr			
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Ala Asp Lys Asn Lys Lys Glu Phe Gly Lys Leu Pro Glu Asp Gly Ala			
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625	630	635	
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Asn Pro Ala Leu Thr His Gly Val Ser Glu Tyr Ile Gly Ser Val Glu			
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Glu Gly Lys Ile Ala Asp Leu Val Val Trp Asn Pro Ala Phe Phe Gly			
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gta aaa ccc aaa atc gtg atc aaa ggc ggt atg gtg gtg ttc tct gaa			2065
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670	675	680	685
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690	695	700	
cgc gaa atg ttt ggg cat cac ggc aag gcg aaa ttt gac acc agc atc			2161
Arg Glu Met Phe Gly His His Gly Lys Ala Lys Phe Asp Thr Ser Ile			
705	710	715	
act ttt gtt tcc aaa gtc gcc tat gaa aat ggc gtg aaa gaa aaa cta			2209
Thr Phe Val Ser Lys Val Ala Tyr Glu Asn Gly Val Lys Glu Lys Leu			
720	725	730	
ggc tta gag cgc aag gtg cta ccc gtg aaa aac tgc cgc aac atc act			2257
Gly Leu Glu Arg Lys Val Leu Pro Val Lys Asn Cys Arg Asn Ile Thr			
735	740	745	
aag aaa gac ttc aaa ttc aac aac aag acg gcg cat atc act gtc gat			2305

Lys Lys Asp Phe Lys Phe Asn Asn Lys Thr Ala His Ile Thr Val Asp	750	755	760	765	
cct aaa acc ttc gag gtc ttt gta gat ggc aaa ctc tgc acc tct aaa					2353
Pro Lys Thr Phe Glu Val Phe Val Asp Gly Lys Leu Cys Thr Ser Lys					
770		775		780	
ccc gcc tct gaa gtg cct cta gcc caa cgc tac act ttc ttc tag					2398
Pro Ala Ser Glu Val Pro Leu Ala Gln Arg Tyr Thr Phe Phe					
785		790		795	

2405
gcacaat

<210> 5
<211> 226
<212> PRT
<213> Helicobacter felis

Val Lys Leu Thr Pro Lys Glu Gln Glu Lys Phe Leu Leu Tyr Tyr Ala	1	5	10	15	
Gly Glu Val Ala Arg Lys Arg Lys Ala Glu Gly Leu Lys Leu Asn Gln					
20		25		30	
Pro Glu Ala Ile Ala Tyr Ile Ser Ala His Ile Met Asp Glu Ala Arg	35	40	45		
Arg Gly Lys Lys Thr Val Ala Glu Leu Met Glu Glu Cys Met His Phe	50	55	60		
Leu Lys Lys Asp Glu Val Met Pro Gly Val Gly Asn Met Val Pro Asp	65	70	75	80	
Leu Gly Val Glu Ala Thr Phe Pro Asp Gly Thr Lys Leu Val Thr Val	85	90		95	
Asn Trp Pro Ile Glu Pro Asp Glu His Phe Lys Ala Gly Glu Val Lys	100	105	110		
Phe Gly Cys Asp Lys Asp Ile Glu Leu Asn Ala Gly Lys Glu Val Thr	115	120	125		
Glu Leu Glu Val Thr Asn Glu Gly Pro Lys Ser Leu His Val Gly Ser	130	135	140		
His Phe His Phe Phe Glu Thr Asn Lys Ala Leu Lys Phe Asp Arg Glu	145	150	155	160	
Lys Ala Tyr Gly Lys Arg Leu Asp Ile Pro Ser Gly Asn Thr Leu Arg	165	170	175		
Ile Gly Ala Gly Gln Thr Arg Lys Val Gln Leu Ile Pro Leu Gly Gly	180	185	190		
Ser Lys Lys Val Ile Gly Met Asn Gly Leu Val Asn Asn Ile Ala Asp	195	200	205		
Glu Arg His Lys His Lys Ala Leu Asp Lys Ala Lys Ser His Gly Phe	210	215	220		

Ile Lys

225

<210> 6
<211> 568
<212> PRT
<213> Helicobacter felis

<400> 6
Met Lys Met Lys Lys Gln Glu Tyr Val Asn Thr Tyr Gly Pro Thr Thr
1 5 10 15
Gly Asp Lys Val Arg Leu Gly Asp Thr Asp Leu Trp Ala Glu Val Glu
20 25 30
His Asp Tyr Thr Thr Tyr Gly Glu Glu Leu Lys Phe Gly Ala Gly Lys
35 40 45
Thr Ile Arg Glu Gly Met Gly Gln Ser Asn Ser Pro Asp Glu Asn Thr
50 55 60
Leu Asp Leu Val Ile Thr Asn Ala Met Ile Ile Asp Tyr Thr Gly Ile
65 70 75 80
Tyr Lys Ala Asp Ile Gly Ile Lys Asn Gly Lys Ile His Gly Ile Gly
85 90 95
Lys Ala Gly Asn Lys Asp Met Gln Asp Gly Val Ser Pro His Met Val
100 105 110
Val Gly Val Gly Thr Glu Ala Leu Ala Gly Glu Gly Met Ile Ile Thr
115 120 125
Ala Gly Gly Ile Asp Ser His Thr His Phe Leu Ser Pro Gln Gln Phe
130 135 140
Pro Thr Ala Leu Ala Asn Gly Val Thr Thr Met Phe Gly Gly Thr
145 150 155 160
Gly Pro Val Asp Gly Thr Asn Ala Thr Thr Ile Thr Pro Gly Lys Trp
165 170 175
Asn Leu His Arg Met Leu Arg Ala Ala Glu Glu Tyr Ser Met Asn Val
180 185 190
Gly Phe Leu Gly Lys Gly Asn Ser Ser Ser Lys Lys Gln Leu Val Glu
195 200 205
Gln Val Glu Ala Gly Ala Ile Gly Phe Lys Leu His Glu Asp Trp Gly
210 215 220
Thr Thr Pro Ser Ala Ile Asp His Cys Leu Ser Val Ala Asp Glu Tyr
225 230 235 240
Asp Val Gln Val Cys Ile His Thr Asp Thr Val Asn Glu Ala Gly Tyr
245 250 255
Val Asp Asp Thr Leu Asn Ala Met Asn Gly Arg Ala Ile His Ala Tyr
260 265 270
His Ile Glu Gly Ala Gly Gly His Ser Pro Asp Val Ile Thr Met
275 280 285
Ala Gly Glu Leu Asn Ile Leu Pro Ser Ser Thr Thr Pro Thr Ile Pro
290 295 300

Tyr Thr Ile Asn Thr Val Ala Glu His Leu Asp Met Leu Met Thr Cys
 305 310 315 320
 His His Leu Asp Lys Arg Ile Arg Glu Asp Leu Gln Phe Ser Gln Ser
 325 330 335
 Arg Ile Arg Pro Gly Ser Ile Ala Ala Glu Asp Val Leu His Asp Ile
 340 345 350
 Gly Val Ile Ala Met Thr Ser Ser Asp Ser Gln Ala Met Gly Arg Ala
 355 360 365
 Gly Glu Val Ile Pro Arg Thr Trp Gln Thr Ala Asp Lys Asn Lys Lys
 370 375 380
 Glu Phe Gly Lys Leu Pro Glu Asp Gly Ala Asp Asn Asp Asn Phe Arg
 385 390 395 400
 Ile Lys Arg Tyr Ile Ser Lys Tyr Thr Ile Asn Pro Ala Leu Thr His
 405 410 415
 Gly Val Ser Glu Tyr Ile Gly Ser Val Glu Glu Gly Lys Ile Ala Asp
 420 425 430
 Leu Val Val Trp Asn Pro Ala Phe Phe Gly Val Lys Pro Lys Ile Val
 435 440 445
 Ile Lys Gly Gly Met Val Val Phe Ser Glu Met Gly Asp Ser Asn Ala
 450 455 460
 Ser Val Pro Thr Pro Gln Pro Val Tyr Tyr Arg Glu Met Phe Gly His
 465 470 475 480
 His Gly Lys Ala Lys Phe Asp Thr Ser Ile Thr Phe Val Ser Lys Val
 485 490 495
 Ala Tyr Glu Asn Gly Val Lys Glu Lys Leu Gly Leu Glu Arg Lys Val
 500 505 510
 Leu Pro Val Lys Asn Cys Arg Asn Ile Thr Lys Lys Asp Phe Lys Phe
 515 520 525
 Asn Asn Lys Thr Ala His Ile Thr Val Asp Pro Lys Thr Phe Glu Val
 530 535 540
 Phe Val Asp Gly Lys Leu Cys Thr Ser Lys Pro Ala Ser Glu Val Pro
 545 550 555 560
 Leu Ala Gln Arg Tyr Thr Phe Phe
 565

<210> 7
 <211> 2183
 <212> DNA
 <213> Helicobacter felis

<220>
 <221> CDS
 <222> (3)..(683)

<220>
 <221> CDS

<222> (694)..(2181)

<400> 7
tc gtg aaa ctc aca ccc aaa gag caa gaa aag ttc ttg tta tat tat 47
Val Lys Leu Thr Pro Lys Glu Gln Glu Lys Phe Leu Leu Tyr Tyr
1 5 10 15

gct ggc gaa gtg gct aga aag cgc aaa gca gag ggc tta aag ctc aat 95
Ala Gly Glu Val Ala Arg Lys Arg Lys Ala Glu Gly Leu Lys Leu Asn
20 25 30

caa ccc gaa gcc att gcc tac att agt gcc cat att atg gac gag gcg 143
Gln Pro Glu Ala Ile Ala Tyr Ile Ser Ala His Ile Met Asp Glu Ala
35 40 45

cgc cgt ggc aaa aaa acc gtt gct gaa ctt atg gaa gaa tgt atg cac 191
Arg Arg Gly Lys Lys Thr Val Ala Glu Leu Met Glu Glu Cys Met His
50 55 60

ttt ttg aaa aaa gat gag gtg atg ccc ggt gtg ggg aat atg gtc cct 239
Phe Leu Lys Lys Asp Glu Val Met Pro Gly Val Gly Asn Met Val Pro
65 70 75

gat ttg ggc gta gaa gcc act ttc ccc gat ggc acc aaa ctc gta acc 287
Asp Leu Gly Val Glu Ala Thr Phe Pro Asp Gly Thr Lys Leu Val Thr
80 85 90 95

gtg aat tgg ccc att gaa cct gat gaa cac ttt aaa gcc ggt gaa gtg 335
Val Asn Trp Pro Ile Glu Pro Asp Glu His Phe Lys Ala Gly Glu Val
100 105 110

aaa ttt ggc tgt gat aaa gac att gag ctc aac gtg ggt aag gaa gtt 383
Lys Phe Gly Cys Asp Lys Asp Ile Glu Leu Asn Val Gly Lys Glu Val
115 120 125

acc gag ctt gaa gtt acc aac gaa gga cct aaa tcc ttg cat gtg ggt 431
Thr Glu Leu Glu Val Thr Asn Glu Gly Pro Lys Ser Leu His Val Gly
130 135 140

agc cat ttc cac ttc ttt gaa acc aac aag gca ttg aaa ttc gat cgg 479
Ser His Phe His Phe Phe Glu Thr Asn Lys Ala Leu Lys Phe Asp Arg
145 150 155

gaa aaa gcc tat ggc aaa cgc cta gat att ccc tct ggc aac acg cta 527
Glu Lys Ala Tyr Gly Lys Arg Leu Asp Ile Pro Ser Gly Asn Thr Leu
160 165 170 175

cgc att ggg gca gga caa acc cgt aaa gtg cag tta atc cct ctt ggc 575

Arg Ile Gly Ala Gly Gln Thr Arg Lys Val Gln Leu Ile Pro Leu Gly			
180	185	190	
ggt agt aaa aaa gtg att ggc atg aac ggg ctt gtg aat aat att gcg	623		
Gly Ser Lys Lys Val Ile Gly Met Asn Gly Leu Val Asn Asn Ile Ala			
195	200	205	
gac gaa cgc cat aaa cac aaa gca cta gac aag gca aaa tct cac gga	671		
Asp Glu Arg His Lys His Lys Ala Leu Asp Lys Ala Lys Ser His Gly			
210	215	220	
ttc atc aag taa ggagactccc atg aaa atg aaa aaa caa gag tat gta	720		
Phe Ile Lys	Met Lys	Met Lys	Gln Glu Tyr Val
225		230	235
aac acc tac gga ccc acc aca ggc gat aaa gtg cgc tta gga gat acc	768		
Asn Thr Tyr Gly Pro Thr Thr Gly Asp Lys Val Arg Leu Gly Asp Thr			
240	245	250	
gat ctt tgg gca gaa gta gaa cat gac tat acc act tat ggc gaa gag	816		
Asp Leu Trp Ala Glu Val Glu His Asp Tyr Thr Thr Tyr Gly Glu Glu			
255	260	265	
ctc aaa ttt ggc gcg ggt aaa act atc cgt gag ggt atg ggt cag agc	864		
Leu Lys Phe Gly Ala Gly Lys Thr Ile Arg Glu Gly Met Gly Gln Ser			
270	275	280	
aat agc cca gat gaa aac acc tta gat tta gtg atc acc aac gcg atg	912		
Asn Ser Pro Asp Glu Asn Thr Leu Asp Leu Val Ile Thr Asn Ala Met			
285	290	295	300
att atc gac tac acc ggg att tat aaa gcc gac att ggt att aaa aat	960		
Ile Ile Asp Tyr Thr Gly Ile Tyr Lys Ala Asp Ile Gly Ile Lys Asn			
305	310	315	
ggc aaa atc cat ggt att ggc aag gcg ggg aac aaa gac atg caa gat	1008		
Gly Lys Ile His Gly Ile Gly Lys Ala Gly Asn Lys Asp Met Gln Asp			
320	325	330	
ggc gta agc cct cat atg gtc gtg ggt gtg ggc aca gaa gca cta gca	1056		
Gly Val Ser Pro His Met Val Val Gly Val Gly Thr Glu Ala Leu Ala			
335	340	345	
ggg gaa ggt atg att att acc gct ggg ggg atc gat tcg cac acc cac	1104		
Gly Glu Gly Met Ile Ile Thr Ala Gly Gly Ile Asp Ser His Thr His			
350	355	360	
ttc ctc tct ccc caa caa ttc cct acc gct cta gcc aat ggt gtt aca	1152		

Phe	Leu	Ser	Pro	Gln	Gln	Phe	Pro	Thr	Ala	Leu	Ala	Asn	Gly	Val	Thr	
365						370				375				380		
acc	atg	ttt	gga	ggt	ggc	aca	ggt	ccg	gta	gat	ggc	acg	aat	gct	acc	1200
Thr	Met	Phe	Gly	Gly	Gly	Thr	Gly	Pro	Val	Asp	Gly	Thr	Asn	Ala	Thr	
385									390				395			
acc	atc	act	ccg	ggc	aaa	tgg	aac	ttg	cac	ccg	atg	ttg	ccg	gca	gct	1248
Thr	Ile	Thr	Pro	Gly	Lys	Trp	Asn	Leu	His	Arg	Met	Leu	Arg	Ala	Ala	
									400		405		410			
gaa	gag	tat	tct	atg	aat	gta	ggc	ttt	ttg	ggc	aaa	ggc	aat	agt	tct	1296
Glu	Glu	Tyr	Ser	Met	Asn	Val	Gly	Phe	Leu	Gly	Lys	Gly	Asn	Ser	Ser	
415						420					425					
agc	aaa	aaa	caa	ctt	gta	gaa	caa	gta	gaa	gct	ggc	ggc	att	ggc	ttt	1344
Ser	Lys	Lys	Gln	Leu	Val	Glu	Gln	Val	Glu	Ala	Gly	Ala	Ile	Gly	Phe	
430						435				440						
aaa	ttg	cat	gaa	gac	tgg	ggc	aca	aca	cca	agt	gct	atc	gat	cac	tgc	1392
Lys	Leu	His	Glu	Asp	Trp	Gly	Thr	Thr	Pro	Ser	Ala	Ile	Asp	His	Cys	
445					450				455			460				
ttg	agc	gtg	gca	gat	gaa	tac	gat	gtg	caa	gtt	tgt	atc	cac	acc	gat	1440
Leu	Ser	Val	Ala	Asp	Glu	Tyr	Asp	Val	Gln	Val	Cys	Ile	His	Thr	Asp	
					465				470			475				
acg	gtc	aat	gag	gca	ggt	tat	gtg	gat	gac	acc	cta	aat	gca	atg	aac	1488
Thr	Val	Asn	Glu	Ala	Gly	Tyr	Val	Asp	Asp	Thr	Leu	Asn	Ala	Met	Asn	
					480				485			490				
ggg	cgc	gcc	atc	cat	gcc	tac	cac	att	gag	gga	gct	ggc	gga	gga	cac	1536
Gly	Arg	Ala	Ile	His	Ala	Tyr	His	Ile	Glu	Gly	Ala	Gly	Gly	Gly	His	
495						500					505					
tca	cct	gat	gtt	atc	acc	atg	gca	ggc	gag	ctc	aat	att	cta	ccc	tcc	1584
Ser	Pro	Asp	Val	Ile	Thr	Met	Ala	Gly	Glu	Leu	Asn	Ile	Leu	Pro	Ser	
510					515					520						
tcc	acc	acc	ccc	act	att	ccc	tat	acc	att	aat	acg	gtt	gca	gaa	cac	1632
Ser	Thr	Thr	Pro	Thr	Ile	Pro	Tyr	Thr	Ile	Asn	Thr	Val	Ala	Glu	His	
525						530				535			540			
tta	gac	atg	ctc	atg	acc	tgc	cac	cac	cta	gat	aag	ccg	atc	ccg	gag	1680
Leu	Asp	Met	Leu	Met	Thr	Cys	His	His	Leu	Asp	Lys	Arg	Ile	Arg	Glu	
						545				550			555			
gat	tta	caa	ttt	tct	caa	agc	cgt	atc	ccg	ccc	gga	tct	att	gcc	gct	1728

Asp Leu Gln Phe Ser Gln Ser Arg Ile Arg Pro Gly Ser Ile Ala Ala	560	565	570	
gag gat gtg ctc cat gat att ggc gtg atc gcg atg act agc tcc gat				1776
Glu Asp Val Leu His Asp Ile Gly Val Ile Ala Met Thr Ser Ser Asp				
575	580	585		
tcg caa gca atg ggg cgc gct ggg gaa gtg att cct aga act tgg caa				1824
Ser Gln Ala Met Gly Arg Ala Gly Glu Val Ile Pro Arg Thr Trp Gln				
590	595	600		
act gca gat aag aat aaa aaa gaa ttt ggt aag ctt cct gaa gat ggt				1872
Thr Ala Asp Lys Asn Lys Lys Glu Phe Gly Lys Leu Pro Glu Asp Gly				
605	610	615	620	
gca gat aac gac aac ttc cgc atc aaa cgc tat atc tcc aaa tac acc				1920
Ala Asp Asn Asp Asn Phe Arg Ile Lys Arg Tyr Ile Ser Lys Tyr Thr				
625	630	635		
att aat ccc gct ttg acc cat ggc gtg agc gag tat atc ggc tct gtg				1968
Ile Asn Pro Ala Leu Thr His Gly Val Ser Glu Tyr Ile Gly Ser Val				
640	645	650		
gaa gag ggc aag atc gcc gac ttg gtg tgg aat cct gcc ttt ttt				2016
Glu Glu Gly Ile Ala Asp Leu Val Val Trp Asn Pro Ala Phe Phe				
655	660	665		
ggc gtg aaa cct aag att gtg att aaa ggt ggc atg gtg gtc ttc tct				2064
Gly Val Lys Pro Lys Ile Val Ile Lys Gly Gly Met Val Val Phe Ser				
670	675	680		
gaa atg ggc gat tct aac gcg tcc gtg ccc acg cct cag ccg gtt tat				2112
Glu Met Gly Asp Ser Asn Ala Ser Val Pro Thr Pro Gln Pro Val Tyr				
685	690	695	700	
tac cgc gaa atg ttt ggg cac cac ggc aag gcg aaa ttt gac acc agc				2160
Tyr Arg Glu Met Phe Gly His His Gly Lys Ala Lys Phe Asp Thr Ser				
705	710	715		
atc act ttt cgt gtc tca agc gg				2183
Ile Thr Phe Arg Val Ser Ser				
720				

<210> 8
 <211> 226
 <212> PRT
 <213> Helicobacter felis

<400> 8

Val Lys Leu Thr Pro Lys Glu Gln Glu Lys Phe Leu Leu Tyr Tyr Ala
1 5 10 15
Gly Glu Val Ala Arg Lys Arg Lys Ala Glu Gly Leu Lys Leu Asn Gln
20 25 30
Pro Glu Ala Ile Ala Tyr Ile Ser Ala His Ile Met Asp Glu Ala Arg
35 40 45
Arg Gly Lys Lys Thr Val Ala Glu Leu Met Glu Glu Cys Met His Phe
50 55 60
Leu Lys Lys Asp Glu Val Met Pro Gly Val Gly Asn Met Val Pro Asp
65 70 75 80
Leu Gly Val Glu Ala Thr Phe Pro Asp Gly Thr Lys Leu Val Thr Val
85 90 95
Asn Trp Pro Ile Glu Pro Asp Glu His Phe Lys Ala Gly Glu Val Lys
100 105 110
Phe Gly Cys Asp Lys Asp Ile Glu Leu Asn Val Gly Lys Glu Val Thr
115 120 125
Glu Leu Glu Val Thr Asn Glu Gly Pro Lys Ser Leu His Val Gly Ser
130 135 140
His Phe His Phe Glu Thr Asn Lys Ala Leu Lys Phe Asp Arg Glu
145 150 155 160
Lys Ala Tyr Gly Lys Arg Leu Asp Ile Pro Ser Gly Asn Thr Leu Arg
165 170 175
Ile Gly Ala Gly Gln Thr Arg Lys Val Gln Leu Ile Pro Leu Gly Gly
180 185 190
Ser Lys Lys Val Ile Gly Met Asn Gly Leu Val Asn Asn Ile Ala Asp
195 200 205
Glu Arg His Lys His Lys Ala Leu Asp Lys Ala Lys Ser His Gly Phe
210 215 220
Ile Lys
225

<210> 9

<211> 496

<212> PRT

<213> Helicobacter felis

<400> 9

Met Lys Met Lys Lys Gln Glu Tyr Val Asn Thr Tyr Gly Pro Thr Thr
1 5 10 15
Gly Asp Lys Val Arg Leu Gly Asp Thr Asp Leu Trp Ala Glu Val Glu
20 25 30
His Asp Tyr Thr Thr Tyr Gly Glu Glu Leu Lys Phe Gly Ala Gly Lys
35 40 45
Thr Ile Arg Glu Gly Met Gly Gln Ser Asn Ser Pro Asp Glu Asn Thr
50 55 60

Leu Asp Leu Val Ile Thr Asn Ala Met Ile Ile Asp Tyr Thr Gly Ile
 65 70 75 80
 Tyr Lys Ala Asp Ile Gly Ile Lys Asn Gly Lys Ile His Gly Ile Gly
 85 90 95
 Lys Ala Gly Asn Lys Asp Met Gln Asp Gly Val Ser Pro His Met Val
 100 105 110
 Val Gly Val Gly Thr Glu Ala Leu Ala Gly Glu Gly Met Ile Ile Thr
 115 120 125
 Ala Gly Gly Ile Asp Ser His Thr His Phe Leu Ser Pro Gln Gln Phe
 130 135 140
 Pro Thr Ala Leu Ala Asn Gly Val Thr Thr Met Phe Gly Gly Thr
 145 150 155 160
 Gly Pro Val Asp Gly Thr Asn Ala Thr Thr Ile Thr Pro Gly Lys Trp
 165 170 175
 Asn Leu His Arg Met Leu Arg Ala Ala Glu Glu Tyr Ser Met Asn Val
 180 185 190
 Gly Phe Leu Gly Lys Gly Asn Ser Ser Ser Lys Lys Gln Leu Val Glu
 195 200 205
 Gln Val Glu Ala Gly Ala Ile Gly Phe Lys Leu His Glu Asp Trp Gly
 210 215 220
 Thr Thr Pro Ser Ala Ile Asp His Cys Leu Ser Val Ala Asp Glu Tyr
 225 230 235 240
 Asp Val Gln Val Cys Ile His Thr Asp Thr Val Asn Glu Ala Gly Tyr
 245 250 255
 Val Asp Asp Thr Leu Asn Ala Met Asn Gly Arg Ala Ile His Ala Tyr
 260 265 270
 His Ile Glu Gly Ala Gly Gly His Ser Pro Asp Val Ile Thr Met
 275 280 285
 Ala Gly Glu Leu Asn Ile Leu Pro Ser Ser Thr Thr Pro Thr Ile Pro
 290 295 300
 Tyr Thr Ile Asn Thr Val Ala Glu His Leu Asp Met Leu Met Thr Cys
 305 310 315 320
 His His Leu Asp Lys Arg Ile Arg Glu Asp Leu Gln Phe Ser Gln Ser
 325 330 335
 Arg Ile Arg Pro Gly Ser Ile Ala Ala Glu Asp Val Leu His Asp Ile
 340 345 350
 Gly Val Ile Ala Met Thr Ser Ser Asp Ser Gln Ala Met Gly Arg Ala
 355 360 365
 Gly Glu Val Ile Pro Arg Thr Trp Gln Thr Ala Asp Lys Asn Lys Lys
 370 375 380
 Glu Phe Gly Lys Leu Pro Glu Asp Gly Ala Asp Asn Asn Phe Arg
 385 390 395 400
 Ile Lys Arg Tyr Ile Ser Lys Tyr Thr Ile Asn Pro Ala Leu Thr His
 405 410 415
 Gly Val Ser Glu Tyr Ile Gly Ser Val Glu Glu Gly Lys Ile Ala Asp
 420 425 430
 Leu Val Val Trp Asn Pro Ala Phe Phe Gly Val Lys Pro Lys Ile Val
 435 440 445

Ile	Lys	Gly	Gly	Met	Val	Val	Phe	Ser	Glu	Met	Gly	Asp	Ser	Asn	Ala
450				455					460						
Ser	Val	Pro	Thr	Pro	Gln	Pro	Val	Tyr	Tyr	Arg	Glu	Met	Phe	Gly	His
465				470				475			480				
His	Gly	Lys	Ala	Lys	Phe	Asp	Thr	Ser	Ile	Thr	Phe	Arg	Val	Ser	Ser
				485				490			495				

<210> 10
<211> 2407
<212> DNA
<213> Helicobacter felis

<220>
<221> CDS
<222> (2)..(682)

<220>
<221> CDS
<222> (693)..(2399)

<400> 10																	
c	gtg	aaa	ctc	aca	ccc	aaa	gag	caa	gaa	aag	ttc	ttg	tta	tat	tat	gcg	49
Val	Lys	Leu	Thr	Pro	Lys	Glu	Gln	Glu	Lys	Phe	Leu	Leu	Tyr	Tyr	Ala		
1				5						10					15		

ggc	gaa	gtg	gct	aga	aag	cgc	aaa	gcg	gag	ggc	tta	aag	ctc	aac	caa	97
Gly	Glu	Val	Ala	Arg	Lys	Arg	Lys	Ala	Glu	Gly	Leu	Lys	Leu	Asn	Gln	
					20				25				30			

ccc	gaa	gcc	att	gcc	tac	att	agt	gcc	cat	att	atg	gac	gag	gcg	cgc	145
Pro	Glu	Ala	Ile	Ala	Tyr	Ile	Ser	Ala	His	Ile	Met	Asp	Glu	Ala	Arg	
					35				40			45				

cgt	ggc	aaa	aag	acc	gtt	gcf	gaa	ctt	atg	gaa	gag	tgt	atg	cac	ttt	193
Arg	Gly	Lys	Lys	Thr	Val	Ala	Glu	Leu	Met	Glu	Glu	Cys	Met	His	Phe	
					50				55			60				

ttg	aaa	aaa	gac	gag	gtg	atg	ccc	ggt	gtg	ggg	aat	atg	gtc	cct	gat	241
Leu	Lys	Lys	Asp	Glu	Val	Met	Pro	Gly	Val	Gly	Asn	Met	Val	Pro	Asp	
					65				70			75		80		

tta	ggc	gtg	gaa	gct	act	ttt	ccc	gat	ggc	acc	aaa	ctc	gta	acc	gtg	289
Leu	Gly	Val	Glu	Ala	Thr	Phe	Pro	Asp	Gly	Thr	Lys	Leu	Val	Thr	Val	
									85			90		95		

aat	tgg	ccc	atc	gaa	ccc	gat	gaa	cac	ttc	aaa	gcg	ggc	gaa	gtc	aaa	337
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Asn Trp Pro Ile Glu Pro Asp Glu His Phe Lys Ala Gly Glu Val Lys			
100	105	110	
ttt ggc tgt gat aaa gac att gaa ctc aac gca ggt aag gaa gtt acc			385
Phe Gly Cys Asp Lys Asp Ile Glu Leu Asn Ala Gly Lys Glu Val Thr			
115	120	125	
gaa cta gaa gtt acc aac gaa gga cct aaa tcc ttg cat gtg ggt agc			433
Glu Leu Glu Val Thr Asn Glu Gly Pro Lys Ser Leu His Val Gly Ser			
130	135	140	
cat ttc cac ttc ttt gaa gcc aac aag gca ttg aaa ttc gat cgg gaa			481
His Phe His Phe Glu Ala Asn Lys Ala Leu Lys Phe Asp Arg Glu			
145	150	155	160
aaa gcc tat ggc aaa cgc cta gat att ccc tct ggc aac acg cta cgc			529
Lys Ala Tyr Gly Lys Arg Leu Asp Ile Pro Ser Gly Asn Thr Leu Arg			
165	170	175	
att ggg gca gga caa acc cgt aaa gtg cag tta atc cct ctt ggc ggc			577
Ile Gly Ala Gly Gln Thr Arg Lys Val Gln Leu Ile Pro Leu Gly Gly			
180	185	190	
agt aaa aaa gtg att ggc atg aac ggg ctt gtg aat aat att gca gat			625
Ser Lys Lys Val Ile Gly Met Asn Gly Leu Val Asn Asn Ile Ala Asp			
195	200	205	
gaa cgc cat aaa cac aaa gcg tta gaa aaa gca aaa tct cac gga ttt			673
Glu Arg His Lys His Lys Ala Leu Glu Lys Ala Lys Ser His Gly Phe			
210	215	220	
atc aaa taa ggagactccc atg aaa atg aaa aaa caa gag tat gta aat			722
Ile Lys	Met Lys	Met Lys	Gln Glu Tyr Val Asn
225	230	235	
acc tac gga cct acc aca ggc gac aaa gtg cgc tta gga gat acc gat			770
Thr Tyr Gly Pro Thr Thr Gly Asp Lys Val Arg Leu Gly Asp Thr Asp			
240	245	250	
ctt tgg gca gaa gta gaa cat gac tat acc act tat ggc gaa gag ctc			818
Leu Trp Ala Glu Val Glu His Asp Tyr Thr Tyr Tyr Gly Glu Glu Leu			
255	260	265	
aaa ttt ggc gcg ggt aaa act atc cgt gag ggc atg ggt cag agc aat			866
Lys Phe Gly Ala Gly Lys Thr Ile Arg Glu Gly Met Gly Gln Ser Asn			
270	275	280	285
agt cca gat gaa aac acc cta gat tta gtc atc acc aac gcg atg att			914

Ser Pro Asp Glu Asn Thr Leu Asp Leu Val Ile Thr Asn Ala Met Ile			
290	295	300	
att gac tac acc ggg att tac aaa gcc gac att ggc att aaa aat ggc	962		
Ile Asp Tyr Thr Gly Ile Tyr Lys Ala Asp Ile Gly Ile Lys Asn Gly			
305	310	315	
aaa atc cat ggc att ggc aag gca gga aac aag gac atg caa gat ggc	1010		
Lys Ile His Gly Ile Gly Lys Ala Gly Asn Lys Asp Met Gln Asp Gly			
320	325	330	
gta agc cct cat atg gtc gtg ggt gtg ggc aca gaa gca tta gca ggg	1058		
Val Ser Pro His Met Val Val Gly Val Gly Thr Glu Ala Leu Ala Gly			
335	340	345	
gaa ggt atg att att acc gct ggg ggg atc gat tca cac acc cac ttc	1106		
Glu Gly Met Ile Ile Thr Ala Gly Gly Ile Asp Ser His Thr His Phe			
350	355	360	365
ctc tct cca caa ttc cct acc gct cta gcc aat ggc gtt aca acc	1154		
Leu Ser Pro Gln Gln Phe Pro Thr Ala Leu Ala Asn Gly Val Thr Thr			
370	375	380	
atg ttt ggc ggt ggc aca ggt ccg gta gat ggc acg aat gcg act acc	1202		
Met Phe Gly Gly Thr Gly Pro Val Asp Gly Thr Asn Ala Thr Thr			
385	390	395	
atc act ccg ggc aaa tgg aac ttg cac cgc atg ttg cgc gca gct gaa	1250		
Ile Thr Pro Gly Lys Trp Asn Leu His Arg Met Leu Arg Ala Ala Glu			
400	405	410	
gag tat tct atg aat gtg ggc ttt ttg ggc aaa ggc aat agc tcc agt	1298		
Glu Tyr Ser Met Asn Val Gly Phe Leu Gly Lys Gly Asn Ser Ser Ser			
415	420	425	
aaa aaa caa ctt gta gaa caa ata gaa gcg ggc gcg atc ggc ttt aaa	1346		
Lys Lys Gln Leu Val Glu Gln Ile Glu Ala Gly Ala Ile Gly Phe Lys			
430	435	440	445
ttg cat gaa gac tgg ggc aca act cca agt gca atc gat cac tgc ttg	1394		
Leu His Glu Asp Trp Gly Thr Thr Pro Ser Ala Ile Asp His Cys Leu			
450	455	460	
agc gta gca gat gaa tac gat gtg caa gtt tgt atc cac acc gat acg	1442		
Ser Val Ala Asp Glu Tyr Asp Val Gln Val Cys Ile His Thr Asp Thr			
465	470	475	
gtc aat gag gca ggt tat gta gat gac acc ctg aat gcg atg aac ggg	1490		

Val Asn Glu Ala Gly Tyr Val Asp Asp Thr Leu Asn Ala Met Asn Gly			
480	485	490	
cgc gcc atc cat gcc tac cac att gag gga gcg ggc gga gga cac tca			1538
Arg Ala Ile His Ala Tyr His Ile Glu Gly Ala Gly Gly His Ser			
495	500	505	
cct gat gtt atc acc atg gca ggc gag ctc aat att cta ccc tcc tcc			1586
Pro Asp Val Ile Thr Met Ala Gly Glu Leu Asn Ile Leu Pro Ser Ser			
510	515	520	525
aca acc ccc act atc ccc tat acc att aat acg gtt gca gaa cac tta			1634
Thr Thr Pro Thr Ile Pro Tyr Thr Ile Asn Thr Val Ala Glu His Leu			
530	535	540	
gac atg ctc atg acc tgc cac cac cta gat aaa cgc atc cgc gag gat			1682
Asp Met Leu Met Thr Cys His His Leu Asp Lys Arg Ile Arg Glu Asp			
545	550	555	
tta caa ttt tcc caa agc cgt atc cgc ccc ggc tct atc gcc gct gaa			1730
Leu Gln Phe Ser Gln Ser Arg Ile Arg Pro Gly Ser Ile Ala Ala Glu			
560	565	570	
gat gtg ctc cat gat att ggc gtg atc gcg atg aca agc tcg gat tcg			1778
Asp Val Leu His Asp Ile Gly Val Ile Ala Met Thr Ser Ser Asp Ser			
575	580	585	
caa gca atg ggg cgc gct ggc gaa gtg att cct cga act tgg cag act			1826
Gln Ala Met Gly Arg Ala Gly Glu Val Ile Pro Arg Thr Trp Gln Thr			
590	595	600	605
gcg gat aag aat aaa aaa gaa ttt ggt aag ctt cct gaa gat agt gca			1874
Ala Asp Lys Asn Lys Lys Glu Phe Gly Lys Leu Pro Glu Asp Ser Ala			
610	615	620	
gat aac gac aac ttc cgt atc aaa cgc tac atc tcc aaa tac act att			1922
Asp Asn Asp Asn Phe Arg Ile Lys Arg Tyr Ile Ser Lys Tyr Thr Ile			
625	630	635	
aac ccc gct cta acc cat ggg gta agc gag tat atc ggc tct gtg gaa			1970
Asn Pro Ala Leu Thr His Gly Val Ser Glu Tyr Ile Gly Ser Val Glu			
640	645	650	
gag ggc aaa atc gct gat ttg gtg gtg tgg aat cct gcc ttt ttt ggt			2018
Glu Gly Lys Ile Ala Asp Leu Val Val Trp Asn Pro Ala Phe Phe Gly			
655	660	665	
gtg aaa cct aag att gtg atc aaa ggc ggt atg gtg gtc ttc tct gaa			2066

Val Lys Pro Lys Ile Val Ile Lys Gly Gly Met Val Val Phe Ser Glu				
670	675	680	685	
atg ggc gac tcc aac gcg tcc gtg cct aca cct cag ccg gtt tat tac				2114
Met Gly Asp Ser Asn Ala Ser Val Pro Thr Pro Gln Pro Val Tyr Tyr				
690	695	700		
cgc gaa atg ttt ggg cat cac ggc aag gcg aaa ttt gac acc agc atc				2162
Arg Glu Met Phe Gly His His Gly Lys Ala Lys Phe Asp Thr Ser Ile				
705	710	715		
act ttt gtt tcc aaa gtc gcc tat gaa aat ggc gtg aaa gaa aaa cta				2210
Thr Phe Val Ser Lys Val Ala Tyr Glu Asn Gly Val Lys Glu Lys Leu				
720	725	730		
ggc tta gag cgc aag gtg cta ccc gtg aaa aac tgc cgc aac atc act				2258
Gly Leu Glu Arg Lys Val Leu Pro Val Lys Asn Cys Arg Asn Ile Thr				
735	740	745		
aag aaa gac ttc aaa ttc aac aac aag acg gcg cat atc act gtc gat				2306
Lys Lys Asp Phe Lys Phe Asn Asn Lys Thr Ala His Ile Thr Val Asp				
750	755	760	765	
cct aaa acc ttc gag gtc ttt gta gat ggc aaa ctc tgc acc tct aaa				2354
Pro Lys Thr Phe Glu Val Phe Val Asp Gly Lys Leu Cys Thr Ser Lys				
770	775	780		
ccc gcc tct gaa gtg cct cta gcc cag cgc tac act ttc ttc tag				2399
Pro Ala Ser Glu Val Pro Leu Ala Gln Arg Tyr Thr Phe Phe				
785	790	795		
gcncaatg				2407

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 <212> PRT
 <213> Helicobacter felis

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 Gly Glu Val Ala Arg Lys Arg Lys Ala Glu Gly Leu Lys Leu Asn Gln
 20 25 30
 Pro Glu Ala Ile Ala Tyr Ile Ser Ala His Ile Met Asp Glu Ala Arg
 35 40 45
 Arg Gly Lys Lys Thr Val Ala Glu Leu Met Glu Glu Cys Met His Phe
 50 55 60

Leu Lys Lys Asp Glu Val Met Pro Gly Val Gly Asn Met Val Pro Asp
 65 70 75 80
 Leu Gly Val Glu Ala Thr Phe Pro Asp Gly Thr Lys Leu Val Thr Val
 85 90 95
 Asn Trp Pro Ile Glu Pro Asp Glu His Phe Lys Ala Gly Glu Val Lys
 100 105 110
 Phe Gly Cys Asp Lys Asp Ile Glu Leu Asn Ala Gly Lys Glu Val Thr
 115 120 125
 Glu Leu Glu Val Thr Asn Glu Gly Pro Lys Ser Leu His Val Gly Ser
 130 135 140
 His Phe His Phe Phe Glu Ala Asn Lys Ala Leu Lys Phe Asp Arg Glu
 145 150 155 160
 Lys Ala Tyr Gly Lys Arg Leu Asp Ile Pro Ser Gly Asn Thr Leu Arg
 165 170 175
 Ile Gly Ala Gly Gln Thr Arg Lys Val Gln Leu Ile Pro Leu Gly Gly
 180 185 190
 Ser Lys Lys Val Ile Gly Met Asn Gly Leu Val Asn Asn Ile Ala Asp
 195 200 205
 Glu Arg His Lys His Lys Ala Leu Glu Lys Ala Lys Ser His Gly Phe
 210 215 220
 Ile Lys
 225

<210> 12
 <211> 568
 <212> PRT
 <213> Helicobacter felis

<400> 12

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 Gly Asp Lys Val Arg Leu Gly Asp Thr Asp Leu Trp Ala Glu Val Glu
 20 25 30
 His Asp Tyr Thr Thr Tyr Gly Glu Leu Lys Phe Gly Ala Gly Lys
 35 40 45
 Thr Ile Arg Glu Gly Met Gly Gln Ser Asn Ser Pro Asp Glu Asn Thr
 50 55 60
 Leu Asp Leu Val Ile Thr Asn Ala Met Ile Ile Asp Tyr Thr Gly Ile
 65 70 75 80
 Tyr Lys Ala Asp Ile Gly Ile Lys Asn Gly Lys Ile His Gly Ile Gly
 85 90 95
 Lys Ala Gly Asn Lys Asp Met Gln Asp Gly Val Ser Pro His Met Val
 100 105 110
 Val Gly Val Gly Thr Glu Ala Leu Ala Gly Glu Gly Met Ile Ile Thr
 115 120 125
 Ala Gly Gly Ile Asp Ser His Thr His Phe Leu Ser Pro Gln Gln Phe
 130 135 140

Pro Thr Ala Leu Ala Asn Gly Val Thr Thr Met Phe Gly Gly Gly Thr
 145 150 155 160
 Gly Pro Val Asp Gly Thr Asn Ala Thr Thr Ile Thr Pro Gly Lys Trp
 165 170 175
 Asn Leu His Arg Met Leu Arg Ala Ala Glu Glu Tyr Ser Met Asn Val
 180 185 190
 Gly Phe Leu Gly Lys Gly Asn Ser Ser Ser Lys Lys Gln Leu Val Glu
 195 200 205
 Gln Ile Glu Ala Gly Ala Ile Gly Phe Lys Leu His Glu Asp Trp Gly
 210 215 220
 Thr Thr Pro Ser Ala Ile Asp His Cys Leu Ser Val Ala Asp Glu Tyr
 225 230 235 240
 Asp Val Gln Val Cys Ile His Thr Asp Thr Val Asn Glu Ala Gly Tyr
 245 250 255
 Val Asp Asp Thr Leu Asn Ala Met Asn Gly Arg Ala Ile His Ala Tyr
 260 265 270
 His Ile Glu Gly Ala Gly Gly His Ser Pro Asp Val Ile Thr Met
 275 280 285
 Ala Gly Glu Leu Asn Ile Leu Pro Ser Ser Thr Thr Pro Thr Ile Pro
 290 295 300
 Tyr Thr Ile Asn Thr Val Ala Glu His Leu Asp Met Leu Met Thr Cys
 305 310 315 320
 His His Leu Asp Lys Arg Ile Arg Glu Asp Leu Gln Phe Ser Gln Ser
 325 330 335
 Arg Ile Arg Pro Gly Ser Ile Ala Ala Glu Asp Val Leu His Asp Ile
 340 345 350
 Gly Val Ile Ala Met Thr Ser Ser Asp Ser Gln Ala Met Gly Arg Ala
 355 360 365
 Gly Glu Val Ile Pro Arg Thr Trp Gln Thr Ala Asp Lys Asn Lys Lys
 370 375 380
 Glu Phe Gly Lys Leu Pro Glu Asp Ser Ala Asp Asn Asp Asn Phe Arg
 385 390 395 400
 Ile Lys Arg Tyr Ile Ser Lys Tyr Thr Ile Asn Pro Ala Leu Thr His
 405 410 415
 Gly Val Ser Glu Tyr Ile Gly Ser Val Glu Glu Gly Lys Ile Ala Asp
 420 425 430
 Leu Val Val Trp Asn Pro Ala Phe Phe Gly Val Lys Pro Lys Ile Val
 435 440 445
 Ile Lys Gly Gly Met Val Val Phe Ser Glu Met Gly Asp Ser Asn Ala
 450 455 460
 Ser Val Pro Thr Pro Gln Pro Val Tyr Tyr Arg Glu Met Phe Gly His
 465 470 475 480
 His Gly Lys Ala Lys Phe Asp Thr Ser Ile Thr Phe Val Ser Lys Val
 485 490 495
 Ala Tyr Glu Asn Gly Val Lys Glu Lys Leu Gly Leu Glu Arg Lys Val
 500 505 510
 Leu Pro Val Lys Asn Cys Arg Asn Ile Thr Lys Lys Asp Phe Lys Phe
 515 520 525

Asn Asn Lys Thr Ala His Ile Thr Val Asp Pro Lys Thr Phe Glu Val			
530	535	540	
Phe Val Asp Gly Lys Leu Cys Thr Ser Lys Pro Ala Ser Glu Val Pro			
545	550	555	560
Leu Ala Gln Arg Tyr Thr Phe Phe			
565			

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<220>
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 <222> (48)..(728)

<220>
 <221> CDS
 <222> (739)..(2445)

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 Val Lys Leu
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aca ccc aaa gag caa gaa aag ttc ttg tta tat tat gcg ggc gaa gtg 104
 Thr Pro Lys Glu Gln Glu Lys Phe Leu Leu Tyr Tyr Ala Gly Glu Val
 5 10 15

gct aga aag cgc aaa gca gag ggc tta aag ctc aac caa ccc gaa gcc 152
 Ala Arg Lys Arg Lys Ala Glu Gly Leu Lys Leu Asn Gln Pro Glu Ala
 20 25 30 35

att gcc tac att agt gcc cat att atg gac gag gcg cgt cgt ggc aaa 200
 Ile Ala Tyr Ile Ser Ala His Ile Met Asp Glu Ala Arg Arg Gly Lys
 40 45 50

aaa acc gtt gcg gaa ctt atg gaa gag tgt atg cac ttt ttg aaa aaa 248
 Lys Thr Val Ala Glu Leu Met Glu Glu Cys Met His Phe Leu Lys Lys
 55 60 65

gac gag gtg atg ccc ggg gtg ggg aat atg gtc cct gat ttg ggc gtg 296
 Asp Glu Val Met Pro Gly Val Gly Asn Met Val Pro Asp Leu Gly Val
 70 75 80

gaa gcc act ttc ccc gat ggc acc aaa ctc gta act gtg aat tgg ccc 344

Glu Ala Thr Phe Pro Asp Gly Thr Lys Leu Val Thr Val Asn Trp Pro			
85	90	95	
atc gaa cct gat gaa cac ttt aag gcg ggt gaa gtg aaa ttt ggc tgt			392
Ile Glu Pro Asp Glu His Phe Lys Ala Gly Glu Val Lys Phe Gly Cys			
100	105	110	115
gat aaa gac att gaa ctc aac gca ggt aag gaa gtt acc gaa cta gaa			440
Asp Lys Asp Ile Glu Leu Asn Ala Gly Lys Glu Val Thr Glu Leu Glu			
120	125	130	
gtt act aac gaa gga cct aaa tcc ttg cat gtg ggt agc cat ttc cac			488
Val Thr Asn Glu Gly Pro Lys Ser Leu His Val Gly Ser His Phe His			
135	140	145	
ttc ttt gaa gcc aac aaa gca ttg aaa ttc gat cgg gaa aaa gcc tat			536
Phe Phe Glu Ala Asn Lys Ala Leu Lys Phe Asp Arg Glu Lys Ala Tyr			
150	155	160	
ggc aaa cgc cta gat att ccc tct ggc aac aca cta cgc att ggg gca			584
Gly Lys Arg Leu Asp Ile Pro Ser Gly Asn Thr Leu Arg Ile Gly Ala			
165	170	175	
gga caa acc cgt aaa gtg cag tta atc cct ctt ggc ggt agt aaa aaa			632
Gly Gln Thr Arg Lys Val Gln Leu Ile Pro Leu Gly Gly Ser Lys Lys			
180	185	190	195
gtg att ggc atg aac ggg ctt gtg aat aat att gcg gac gaa cgc cat			680
Val Ile Gly Met Asn Gly Leu Val Asn Asn Ile Ala Asp Glu Arg His			
200	205	210	
aaa cac aaa gcg cta gac aaa gca aaa tct cac gga ttt atc aag taa			728
Lys His Lys Ala Leu Asp Lys Ala Lys Ser His Gly Phe Ile Lys			
215	220	225	
ggagactccc atg aaa atg aaa aaa caa gag tat gta aat acc tac gga			777
Met Lys Met Lys Lys Gln Glu Tyr Val Asn Thr Tyr Gly			
230	235	240	
ccc acc aca ggc gat aaa gtg cgc tta gga gat acc gat ctt tgg gca			825
Pro Thr Thr Gly Asp Lys Val Arg Leu Gly Asp Thr Asp Leu Trp Ala			
245	250	255	
gaa gta gaa cat gac tat acc acc tat ggc gaa gaa ctc aaa ttc ggt			873
Glu Val Glu His Asp Tyr Thr Tyr Gly Glu Glu Leu Lys Phe Gly			
260	265	270	
gca ggt aaa act atc cgt gag ggt atg ggt cag agc aat agc cca gat			921

Ala	Gly	Lys	Thr	Ile	Arg	Glu	Gly	Met	Gly	Gln	Ser	Asn	Ser	Pro	Asp	
275						280								285		
gaa aac acc tta gat tta gtg atc acc aac gcg atg att att gac tac															969	
Glu Asn Thr Leu Asp Leu Val Ile Thr Asn Ala Met Ile Ile Asp Tyr																
290			295											300		
acc ggg att tac aaa gcc gac att ggc att aaa aat ggc aaa atc cat															1017	
Thr Gly Ile Tyr Lys Ala Asp Ile Gly Ile Lys Asn Gly Lys Ile His																
305			310											315		
ggc att ggc aag gca gga aac aag gac atg caa gat ggc gta agc cct															1065	
Gly Ile Gly Lys Ala Gly Asn Lys Asp Met Gln Asp Gly Val Ser Pro																
325			330											335		
cat atg gtc gtg ggt gtg ggc aca gaa gca cta gca ggg gaa ggt atg															1113	
His Met Val Val Gly Val Gly Thr Glu Ala Leu Ala Gly Glu Gly Met																
340			345											350		
att att acc gct ggg ggg atc gat tca cac acc cac ttc ctc tct cca															1161	
Ile Ile Thr Ala Gly Gly Ile Asp Ser His Thr His Phe Leu Ser Pro																
355			360											365		
caa caa ttc cct acc gct cta gcc aat ggc gtt aca aca atg ttt ggc															1209	
Gln Gln Phe Pro Thr Ala Leu Ala Asn Gly Val Thr Thr Met Phe Gly																
370			375											380		
ggc aca ggc ccc gta gat ggc acg aat gcg act acc atc act ccg															1257	
Gly Gly Thr Gly Pro Val Asp Gly Thr Asn Ala Thr Thr Ile Thr Pro																
385			390											400		
ggc aaa tgg aac ttg cac cgc atg ttg cgc gca gca gaa gag tat tct															1305	
Gly Lys Trp Asn Leu His Arg Met Leu Arg Ala Ala Glu Glu Tyr Ser																
405			410											415		
atg aat gtg ggc ttt ttg ggc aaa ggc aat agc tct agt aaa aaa caa															1353	
Met Asn Val Gly Phe Leu Gly Lys Gly Asn Ser Ser Ser Lys Lys Gln																
420			425											430		
ctt gta gaa caa gta gaa gcg ggc gcg att ggt ttt aaa ttg cat gaa															1401	
Leu Val Glu Gln Val Glu Ala Gly Ala Ile Gly Phe Lys Leu His Glu																
435			440											445		
gac tgg ggc aca act cca agt gcg atc gat cac tgc ttg agc gta gca															1449	
Asp Trp Gly Thr Thr Pro Ser Ala Ile Asp His Cys Leu Ser Val Ala																
450			455											460		
gat gaa tac gat gtg caa gtt tgt ata cac acc gat acg gtc aat gag															1497	

Asp Glu Tyr Asp Val Gln Val Cys Ile His Thr Asp Thr Val Asn Glu				
465	470	475	480	
gca ggt tat gta gat gac acc cta aat gca atg aac ggg cgc gcc atc				1545
Ala Gly Tyr Val Asp Asp Thr Leu Asn Ala Met Asn Gly Arg Ala Ile				
485	490	495		
cat gcc tac cac att gag gga gcg ggt gga gga cac tca cct gat gtt				1593
His Ala Tyr His Ile Glu Gly Ala Gly Gly His Ser Pro Asp Val				
500	505	510		
atc acc atg gca ggc gaa gtg aat att cta ccc tcc tcc aca acc cct				1641
Ile Thr Met Ala Gly Glu Val Asn Ile Leu Pro Ser Ser Thr Thr Pro				
515	520	525		
act atc ccc tat acc att aat acg gtt gca gaa cac tta gac atg ctt				1689
Thr Ile Pro Tyr Thr Ile Asn Thr Val Ala Glu His Leu Asp Met Leu				
530	535	540		
atg acc tgc cac cac cta gat aaa cgc atc cgc gag gat ctc caa ttt				1737
Met Thr Cys His His Leu Asp Lys Arg Ile Arg Glu Asp Leu Gln Phe				
545	550	555	560	
tct caa agc cgt atc cgc ccc ggc tct atc gcc gct gaa gat gtg ctc				1785
Ser Gln Ser Arg Ile Arg Pro Gly Ser Ile Ala Ala Glu Asp Val Leu				
565	570	575		
cat gat atc ggt gtg atc gcg atg aca agt tcc gat tcg caa gca atg				1833
His Asp Ile Gly Val Ile Ala Met Thr Ser Ser Asp Ser Gln Ala Met				
580	585	590		
ggg cgc gct ggg gaa gtg att cct aga act tgg caa act gca gac aag				1881
Gly Arg Ala Gly Glu Val Ile Pro Arg Thr Trp Gln Thr Ala Asp Lys				
595	600	605		
aat aaa aaa gaa ttt ggt aag ctt cct gaa gat ggt gca gat aat gac				1929
Asn Lys Lys Glu Phe Gly Lys Leu Pro Glu Asp Gly Ala Asp Asn Asp				
610	615	620		
aac ttc cgc atc aaa cgc tat atc tcc aaa tac acc att aat ccc gct				1977
Asn Phe Arg Ile Lys Arg Tyr Ile Ser Lys Tyr Thr Ile Asn Pro Ala				
625	630	635	640	
ttg acc cat ggc gtg agc gag tat atc ggc tct gtg gaa gag ggc aag				2025
Leu Thr His Gly Val Ser Glu Tyr Ile Gly Ser Val Glu Glu Gly Lys				
645	650	655		
atc gcc gac ttg gtg tgg aat cct gcc ttt ttt ggc gta aaa ccc				2073

Ile Ala Asp Leu Val Val Trp Asn Pro Ala Phe Phe Gly Val Lys Pro				
660	665	670		
aaa atc gtg atc aaa ggc ggt atg gtg gtg ttc tct gaa atg ggc gat			2121	
Lys Ile Val Ile Lys Gly Gly Met Val Val Phe Ser Glu Met Gly Asp				
675	680	685		
tct aat gcg tct gtg ccc act cct cag ccg gtt tat tac cgc gaa atg			2169	
Ser Asn Ala Ser Val Pro Thr Pro Gln Pro Val Tyr Tyr Arg Glu Met				
690	695	700		
ttt ggg cat cac ggc aag gcg aaa ttt gac acc agc atc act ttt gtt			2217	
Phe Gly His His Gly Lys Ala Lys Phe Asp Thr Ser Ile Thr Phe Val				
705	710	715	720	
tcc aaa gtc gcc tat gaa aat ggt gtg aaa gaa aaa cta ggt tta gag			2265	
Ser Lys Val Ala Tyr Glu Asn Gly Val Lys Glu Lys Leu Gly Leu Glu				
725	730	735		
cgc aag gtc ctc ccc gtg aaa aac tgc cgt aac atc acc aag aag gac			2313	
Arg Lys Val Leu Pro Val Lys Asn Cys Arg Asn Ile Thr Lys Lys Asp				
740	745	750		
ttc aag ttc aac gac aaa act gca aaa atc acc gtc gat ccg aaa acc			2361	
Phe Lys Phe Asn Asp Lys Thr Ala Lys Ile Thr Val Asp Pro Lys Thr				
755	760	765		
ttc gag gtc ttt gta gat ggc aaa ctc tgc acc tct aaa ccc acc tct			2409	
Phe Glu Val Phe Val Asp Gly Lys Leu Cys Thr Ser Lys Pro Thr Ser				
770	775	780		
gaa gtg cct cta gcc caa cgc tac act ttc ttc tag gcataat			2452	
Glu Val Pro Leu Ala Gln Arg Tyr Thr Phe Phe				
785	790	795		
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<213> Helicobacter felis				
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Val Lys Leu Thr Pro Lys Glu Gln Glu Lys Phe Leu Leu Tyr Tyr Ala				
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Gly Glu Val Ala Arg Lys Arg Lys Ala Glu Gly Leu Lys Leu Asn Gln				
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Pro Glu Ala Ile Ala Tyr Ile Ser Ala His Ile Met Asp Glu Ala Arg				
35 40 45				

Arg Gly Lys Lys Thr Val Ala Glu Leu Met Glu Glu Cys Met His Phe
 50 55 60
 Leu Lys Lys Asp Glu Val Met Pro Gly Val Gly Asn Met Val Pro Asp
 65 70 75 80
 Leu Gly Val Glu Ala Thr Phe Pro Asp Gly Thr Lys Leu Val Thr Val
 85 90 95
 Asn Trp Pro Ile Glu Pro Asp Glu His Phe Lys Ala Gly Glu Val Lys
 100 105 110
 Phe Gly Cys Asp Lys Asp Ile Glu Leu Asn Ala Gly Lys Glu Val Thr
 115 120 125
 Glu Leu Glu Val Thr Asn Glu Gly Pro Lys Ser Leu His Val Gly Ser
 130 135 140
 His Phe His Phe Phe Glu Ala Asn Lys Ala Leu Lys Phe Asp Arg Glu
 145 150 155 160
 Lys Ala Tyr Gly Lys Arg Leu Asp Ile Pro Ser Gly Asn Thr Leu Arg
 165 170 175
 Ile Gly Ala Gly Gln Thr Arg Lys Val Gln Leu Ile Pro Leu Gly Gly
 180 185 190
 Ser Lys Lys Val Ile Gly Met Asn Gly Leu Val Asn Asn Ile Ala Asp
 195 200 205
 Glu Arg His Lys His Lys Ala Leu Asp Lys Ala Lys Ser His Gly Phe
 210 215 220
 Ile Lys
 225

<210> 15
 <211> 568
 <212> PRT
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 His Asp Tyr Thr Thr Tyr Gly Glu Glu Leu Lys Phe Gly Ala Gly Lys
 35 40 45
 Thr Ile Arg Glu Gly Met Gly Gln Ser Asn Ser Pro Asp Glu Asn Thr
 50 55 60
 Leu Asp Leu Val Ile Thr Asn Ala Met Ile Ile Asp Tyr Thr Gly Ile
 65 70 75 80
 Tyr Lys Ala Asp Ile Gly Ile Lys Asn Gly Lys Ile His Gly Ile Gly
 85 90 95
 Lys Ala Gly Asn Lys Asp Met Gln Asp Gly Val Ser Pro His Met Val
 100 105 110
 Val Gly Val Gly Thr Glu Ala Leu Ala Gly Glu Gly Met Ile Ile Thr
 115 120 125

Ala Gly Gly Ile Asp Ser His Thr His Phe Leu Ser Pro Gln Gln Phe
 130 135 140
 Pro Thr Ala Leu Ala Asn Gly Val Thr Thr Met Phe Gly Gly Gly Thr
 145 150 155 160
 Gly Pro Val Asp Gly Thr Asn Ala Thr Thr Ile Thr Pro Gly Lys Trp
 165 170 175
 Asn Leu His Arg Met Leu Arg Ala Ala Glu Glu Tyr Ser Met Asn Val
 180 185 190
 Gly Phe Leu Gly Lys Gly Asn Ser Ser Ser Lys Lys Gln Leu Val Glu
 195 200 205
 Gln Val Glu Ala Gly Ala Ile Gly Phe Lys Leu His Glu Asp Trp Gly
 210 215 220
 Thr Thr Pro Ser Ala Ile Asp His Cys Leu Ser Val Ala Asp Glu Tyr
 225 230 235 240
 Asp Val Gln Val Cys Ile His Thr Asp Thr Val Asn Glu Ala Gly Tyr
 245 250 255
 Val Asp Asp Thr Leu Asn Ala Met Asn Gly Arg Ala Ile His Ala Tyr
 260 265 270
 His Ile Glu Gly Ala Gly Gly His Ser Pro Asp Val Ile Thr Met
 275 280 285
 Ala Gly Glu Val Asn Ile Leu Pro Ser Ser Thr Thr Pro Thr Ile Pro
 290 295 300
 Tyr Thr Ile Asn Thr Val Ala Glu His Leu Asp Met Leu Met Thr Cys
 305 310 315 320
 His His Leu Asp Lys Arg Ile Arg Glu Asp Leu Gln Phe Ser Gln Ser
 325 330 335
 Arg Ile Arg Pro Gly Ser Ile Ala Ala Glu Asp Val Leu His Asp Ile
 340 345 350
 Gly Val Ile Ala Met Thr Ser Ser Asp Ser Gln Ala Met Gly Arg Ala
 355 360 365
 Gly Glu Val Ile Pro Arg Thr Trp Gln Thr Ala Asp Lys Asn Lys Lys
 370 375 380
 Glu Phe Gly Lys Leu Pro Glu Asp Gly Ala Asp Asn Asp Asn Phe Arg
 385 390 395 400
 Ile Lys Arg Tyr Ile Ser Lys Tyr Thr Ile Asn Pro Ala Leu Thr His
 405 410 415
 Gly Val Ser Glu Tyr Ile Gly Ser Val Glu Glu Gly Lys Ile Ala Asp
 420 425 430
 Leu Val Val Trp Asn Pro Ala Phe Phe Gly Val Lys Pro Lys Ile Val
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 Ile Lys Gly Gly Met Val Val Phe Ser Glu Met Gly Asp Ser Asn Ala
 450 455 460
 Ser Val Pro Thr Pro Gln Pro Val Tyr Tyr Arg Glu Met Phe Gly His
 465 470 475 480
 His Gly Lys Ala Lys Phe Asp Thr Ser Ile Thr Phe Val Ser Lys Val
 485 490 495
 Ala Tyr Glu Asn Gly Val Lys Glu Lys Leu Gly Leu Glu Arg Lys Val
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Leu Pro Val Lys Asn Cys Arg Asn Ile Thr Lys Lys Asp Phe Lys Phe
515 520 525
Asn Asp Lys Thr Ala Lys Ile Thr Val Asp Pro Lys Thr Phe Glu Val
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